1 July 1971

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Materiel Test Procedure 5-3-512
U.S. Army Air Defense Board

U.S. ARMY TEST AND EVALUATION COMMAND
COMMON SERVICE TEST PROCEDURE

TRANSPORTABILITY

1. OBJECTIVE

The objective of this Materiel Test Procedure is to determine the capability of missile and rocket systems and associated equipment for surface transportability as indicated by applicable criteria in the Materiel Need (MN) and to demonstrate the suitability of such equipment for Army use in transportability operations.

2. BACKGROUND

Missile and rocket systems, especially air defense weapons systems, must be deployed and re-deployed with ease and rapidity. Transportability features of these systems must be of a quality which enables them to be available for support of field army forces without imposing operational delays on the use of such forces, and without exposing them undefended to hostile action. Transportability characteristics of systems and equipment are subject to improvement, and service tests of transportability under actual or simulated field conditions will be required for new or improved items.

3. REQUIRED EQUIPMENT

a. Transportability Test Courses
b. Specified Transport Vehicles
c. Actual or Simulated Rail Facilities including Specified Cars
d. Actual or Simulated Marine Facilities including Docks, Specified Ships, and Landing Craft
e. Cranes, Hoists, and Associated Equipment
f. Tiedowns, Chocks, and Lashing Material
g. Strapping Material and Equipment
h. Protective Cover Material
i. Still and Motion Picture Cameras and Film
j. Voice Tape Recorders
k. Elapsed Time Recorders (Stop watches)
l. Weighing Scales
m. Measuring Tapes and Scales
n. Meterorological Instrumentation
o. Maintenance Test Package and Maintenance Support Facilities as required for Commodity Service Test

4. REFERENCES

A. Applicable MN for Test Item

B. AR 70-10, Army Materiel Testing
C. USATECOM Regulation 385-6, Verification of Safety of Materiel During Testing
D. USATECOM Regulation 705-4, Equipment Performance Report
E. AR 705-8, Department of Defense Engineering for Transportability Program
F. USATECOM Reguluation 705-15, Operation of Materiel under Extreme Conditions of Environment
G. FM 55-15, Transportation Reference Data
H. MIL-STD-209B, Slinging Eyes and Attachments for Lifting and Tieing Down Heavy Military Equipment
I. MTP 5-3-500, Preoperational Inspection and Physical Characteristics
J. M TP 10-3-501, Operator Training and Familiarization
K. MTP 10-3-504, Maintenance Evaluation

5. SCOPE

5.1 SUMMARY

This MTP contains the procedures necessary to subject the test item to transportability tests and evaluations, including the following:

a. Preoperational Inspection - an evaluation of the condition of the test item upon arrival, it completeness and readiness for testing.

b. Highway Transportability - an evaluation of the test item capability for being transported over highways in applicable modes: self-propelled, towed, or loaded on authorized vehicles.

c. Cross-Country Transportability - an evaluation of the test item capability for being transported over various off-highway surfaces in applicable modes: self- propelled, towed, or in authorized vehicles.

d. Rail Transportability - an evaluation of the test item capability for being transported aboard railway cars - U.S. and foreign.

e. Marine Transportability - an evaluation of the test item capability for being transported aboard ocean going vessels.

f. Maintainability - an evaluation of the capability of the test item for being kept in the appropriate condition of readiness for its next phase of utilization during each of the transportation modes being investigated.

g. Post-Test Inspection - a repeat of the preoperational inspections conducted on the test item.

5.2 LIMITATIONS

Tests in this MTP are limited to surface transportability of missile and rocket systems. For air transportability tests see MTP 7-3-512, MTP 7-3-513, and MTP 7-3-516. For battlefield mobility tests see MTP 5-3-501. For surface transportability of vehicles see MTP 2-3-519.

6. PROCEDURES

6.1 PREPARATION FOR TEST

6.1.1 Scheduling

6.1.1.1 Personnel

a. Ensure that personnel assigned to conduct the evaluations of this MTP are familiar with the test item, its mission and use cycle, handling, and maintenance, as described in applicable sections of MTP 10-3-501. Ensure that personnel assigned to operate the transportation equipment and facilities are trained and familiar with equipment and procedures.

b. Record details of identity, training, and experience of all assigned personnel.

6.1.1.2 Facilities

a. Ensure that the actual or simulated transportation facilities required for the tests are available as scheduled.

b. Record details of nomenclature, type, model, serial number of transportation vehicles to be used in the tests.

6.1.2 Pre-Test Operations

6.1.2.1 Preoperational Inspection

Ensure that the test item and its maintenance test package have been subjected to arrival inspection, inventorying, technical literature inspection, preoperational inspection, and physical characteristics recording in accordance with applicable sections of MTP 5-3-500. Particular attention will be given to the following:

a. Dimensions and weights of travelling configurations. Photographs will be taken.

b. Provisions for covering or otherwise protecting the test item during each mode of transportation investigated. Photographs will be taken.

c. Applicable instructions in technical manuals relative to transportation of the test items and to on-board or contiguous storage of ancillary equipment.

d. Pertinent data from engineering tests regarding properties of the test item relating to transportation, including:

1) Shock and vibration sensitivity considerations
2) Center of gravity:
   a) Above ground
   b) Longitudinal
   c) Transverse
3) Rolling and maneuvering characteristics of wheeled items, including wheel loadings - compared with allowable loads anticipated for roads to be traversed.

6.1.2.2 Safety Release

Review safety release and assure that all prescribed safety measures have been incorporated in the test operations. (TECR 385-6).

6.2 TEST CONDUCT

The concept of this test procedure is to conduct transportation operations with the test item and authorized surface transport vehicles, assigning average trained personnel to handle the equipment. Satisfactory or unsatisfactory characteristics of transportability are determined by experienced observers of both the transportation operations themselves and the concurrent and sequential maintenance operations necessary for support of the test item in transit, and to prepare the test item for movement from the delivery point. Conditions of weather, terrain, and fixed facilities are to be representative of actual situations anticipated during use of the test item in assigned theaters of operations.

6.2.1 Highway Transportability

Schedule and conduct a series of road marches with the test item in travelling configuration, commencing with applicable loading operations aboard authorized carriers. Observe the following:

a. Characteristics of autonomous self-propelled test items - conduct road marches over surfaces highways and secondary roads. Unless otherwise directed, distances will be 200 miles per day for two days. Record:

1) Average speed
2) POL consumption
3) Difficulties or delays relating to transportation of of the test item
4) Damage caused by emergency stops.

aboard specified vessels, such as amphibious attack transport (APA) and landing ship tank (LST). Conduct loading, transporting, and unloading operations and record the following:

a. Type of carrier.

b. Composition of transportation organization.

c. Times required and experience encountered during:

1) Transferring test item from dock to vessel.
2) Securing test item in place, including methods and materials.

d. Effectiveness of tiedowns, dunnage, and bracing during operation of the marine carrier under rough sea conditions.

NOTE: Optimum rough sea conditions for this test are:

1. Beaufort Scale 6 wind (28-31 mph).
2. Sea state 5 (10 to 18-foot waves).

e. Times required and experience encountered during:

1) Release of test item from secured condition.
2) Transferring test item from vessel to land.

6.2.5 Maintainability

Refer to MTP 10-3-504, Maintenance Evaluation, and conduct scheduled maintenance operations as specified for the test item and corrective maintenance operations as required during each phase of transportability testing. Record the following:

a. Type and description of maintenance operations.

b. Times required for accomplishment of maintenance tasks.

c. Repair parts and expendable materials used.

d. Relationship between maintenance actions and the accompanying transportation phase.

e. Special maintenance tasks associated with lifting or tiedown operations.

6.3 TEST DATA

Record data as collected under this MTP and applicable referenced MTPs. Use still and motion picture photography, with color film when lighting

permits, to record conditions and events of significance to the service test findings.

NOTE: Uniform reporting considerations require that distance, dimensions and weights will be reported in metric units (kilometers, centimeters, millimeters, kilograms). Measurements taken in any other units will be converted as necessary into the appropriate metric units.

6.3.1 Preparation for Test

6.3.1.1 Personnel

Record the following for all service personnel:

a. Rank and identifying number.

b. MOS.

c. Training time in MOS, weeks.

d. Experience in MOS, months.

e. Training time with test item, weeks.

6.3.1.2 Pretest Operations

6.3.1.2.1 Preoperational Inspection - Record data as collected under applicable sections of MTP 5-3-500 including the following:

a. Photographs of the test item in travelling configuration.

b. Dimensions in centimeters/millimeters, weights in kilograms.

c. Lists of missing articles in the maintenance test package: documents, spare parts, tools, and test equipment.

d. Comments on the adequacy of instructions in manuals relative to transportation of the test item.

e. Comments on the completeness of data on transportability properties of the test item: sensitivity to shock and vibration, center of gravity characteristics, rolling and maneuvering characteristics.

6.3.1.2.2 Safety Release - Record document reference numbers and dates.

6.3.2 Test Conduct

6.3.2.1 Highway Transportability

a. Record distance in kilometers, speed in kilometers per hour, details of road surfaces used, and whether test item was operated in column with other vehicles.

b. Record POL consumption in kilometers per gallon of fuel, kilometers per quart of lubricating oil.

c. Record narrative comments, supported by photographs, concerning difficulties or delays experienced in loading or unloading the test item, or with any phase of the road march.

d. Record times in minutes required for each phase of loading and unloading operations: moving on carrier, tiedown operations, release for off-loading , moving off carrier.

e. Record narrative comments, supported by photographs, concerning problems or damage caused by emergency stops.

f. Record narrative comments, supported by photographs, concerning difficulties with the test item, its loading and tiedown provisions, or its road march experience, including difficulties arising from inadequate instructions in manuals.

6.3.2.2 Cross Country Transportability

a. Record details of courses travelled, including:

1) Nature of surface - ballast, graded, cleared, unimproved.
2) Profiles of courses, including grades (positive and negative referred to direction of march) and radius of curves in meters.
3) Prevailing weather and lighting conditions.

b. Record details of transportaiton experience, including:

1) Distances covered and amount of travelling in column, kilometers.
2) Average speed in km per hour.
3) POL consumption.
4) Times of delays in hours and minutes.
5) Narrative comments, supported by photographs, relative to causes of delays, equipment damage, and effects of weather.

6.3.2.3 Rail Transportability

a. Record times in minutes required for each phase of rail car

loading operations: moving test item on car, blocking and tiedown operations, release for off-loading, moving off car.

b. Record details of the rail travelling configuration:

1) Nomenclature and model of rail car.
2) Clearance dimensions in centimeters, referred to standards incorporated in a Rail Clearance Device.

c. Record photographically details of the travelling configuration, with attention to features potentially unstable when exposed to prolonged wind, weather, and vibration.

d. Record comments, supported by photographs, concerning any deterioration or shifting of the test item or damage to its blocking and tiedown provisions caused by impact (humping) tests. Include the following:

1) Nonmenclature and model of striking cars.
2) Weights in kilograms of loaded and striking cars.
3) Relevant details of the blocking and tiedown provisions.
4) Motion pictures of the impact tests.

6.3.2.4 Marine Transportability

a. Record nomenclature and model information on marine carrier.

b. Record number and organizational arrangement of transportation personnel engaged in handling operations.

c. Record times in minutes required for each phase of loading and unloading operations: transfer from dock to vessel, movement to tiedown site, blocking and tiedown operations, release for off-loading, movement from vessel to land. Record materials used for blocking and tiedown.

d. Record narrative comments, supported by photographs, concerning any shifting or damage to test item or blocking and tiedown provisions caused by rough sea conditions. Include the following:

1) Duration of rough sea conditions, hours.
2) Wind force, Beaufort Scale.
3) Sea state.

e. Record narrative comments, supported by photographs, concerning any difficulties encountered during loading or unloading operations, with blocking and tiedown, incompatibilities of test item and marine carrier, and with problems caused by inadequate instructions in manuals.

6.3.2.5 Maintainability

Record data as collected under applicable sections of MTP 10-3-504, including the following:

a. Complete a Maintenance Data Sheet (refer to Appendix A, MTP 10-3-504), for each action taken.

b. Record detailed comments relative to the connection between each maintenance action and the associated phases of transportability operations. Include special maintenance tasks associated with lifting and tiedown.

c. Record narrative comments, supported by photographs, concerning any difficulties with maintenance operations. Include attention to the following:

1) Availability of tools, repair parts, and supplies.
2) Adequacy of instructions in manuals.
3) Repairs caused by transportability operations.

6.4 DATA REDUCTION AND PRESENTATION

a. Summaries of data from transportability tests conducted under this MTP will be included in the report of commodity service tests on the test item. Qualitative evaluations will be reported of the degree of fulfillment demonstrated by the test item in comparison with transportability requirements or criteria in MN or other applicable requirements.

b. Data will be summarized, compared and evaluated as directed in this MTP or referenced MTPs, or according to equivalent current practice where not otherwise covered. Appropriate charts, graphs, and tables will be used to display summaries and comparisons of test data. Coordinates and other features of charts, graphs, and tables will be selected for clarity and uniformity with the presentations in other current reports.

c. Special consideration in data presentation will be given to any condition or circumstance which may have significantly influenced the test results. Data collected under adverse weather conditions, when not a requirement of the test, will be separately compared with data collected under normal weather conditions.

d. Calculations will be performed as required by this MTP and in accordance with current practice. All photographs, motion pictures, audio tapes, and other records will be explicitly identified and referenced; significant frames, transcriptions, and samples will be selected for illustrative purposes. All illustrations will be completely identified.

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13. ABSTRACT

This procedure defines the methodology for evaluating the suitability of missile and rocket systems for surface transport.

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14. KEY WORDS	LINK A		LINK B		LINK C	
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